FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

1925
Sept. 19–28 F.I.A. Conference at Prague.
Sept. 27–Oct. 7 "On to New York" Contest.
Sept. 27–Oct. 10 American "National Aviation Meet," Mitchel Field, Long Island, N.Y.
Sept. 28 .... Ford Trophy, Detroit, U.S.A.
Oct. 1 .... Maj.-Gen. Sir Sefton Brancker, K.C.B., A.F.C. "The Technical Lesson of Five Years of Air Transport," before R.Ae.S.
Oct. 8 .... Aero Golfing Soc. Autumn Meeting, Walton Heath.
Oct. 10 .... Pulitzer Trophy, Long Island, U.S.A.
Oct. 15 .... Maj. C. K. Cochran-Patrick, D.S.O., M.C. "Aircraft Survey in Burma," before R.Ae.S.
Oct. 24–29 Schneider Cup Race, Baltimore, U.S.A.
Oct. 29 .... Mr. W. L. Cowley. "Aircraft Transport Economy," before R.Ae.S.
Nov. 3 .... Sir Dugald Clerk, K.B.E., F.R.S., D.Sc., M.I.M.E., M.I.C.E., F.R.Ae.S. "Supercharging," before R.Ae.S.

EDITORIAL COMMENT.

A SUBJECT which has been much to the front these last two weeks or so is that of seaplanes. First we had the French competition for commercial seaplanes at St. Raphaël, and then there was the flight of the American P.N.9, which made such a startling reappearance after having been practically given up as lost. Then there was the interesting paper on progress of development in flying-boat design read by Mr. Simmonds before the British Association at Southampton, and a *résumé* of which was published in FLIGHT last week, in which the author pointed out certain promising lines of development. Finally, there is the approach of the Schneider Seaplane race at Baltimore, the two British entrants for which have been undergoing flying tests for more than a week. Thus, altogether interest is concentrated for the moment on a type of machine which for years was given very stepmotherly treatment in this country, but which is now, fortunately, beginning to come into its own.

Seaplanes

It is true, of course, that the French competition proved something of a disappointment, and was in addition marred by the disappearance and assumed loss of two seaplanes and their crews, but as against that set-back we have the wonderful adventure of the American P.N.9 boat, on which Comdr. John Rodgers and his crew were missing for ten days and were given up as lost, when, in a most dramatic fashion, news suddenly came that they had been rescued alive and well.

It might be thought somewhat strange that we should regard an adventure like that which befell the American seaplane as being on the credit side of the ledger. Yet surely one is entitled to do so, and the supporters of the seaplane type are justified in claiming the performance as a proof of the vast possibilities of the seaplane, for did not the machine keep afloat for ten days and ultimately enable a submarine to take it in tow, with its crew exhausted but otherwise safe and sound? Surely no better

answer could be given those who regard the seaplane as a craft which may be all very well in its way so long as the sea remains smooth, but which is doomed as soon as a bit of a swell gets up.

That the P.N.9 failed to reach its objective in flight does not really matter one jot, although it must naturally have been a very keen disappointment to the Americans. What does matter is the striking proof which the incident provided of the amazing seaworthiness of the modern seaplane. And the P.N.9, be it noted, is not a particularly large boat, as will be seen from the photographs and particulars published elsewhere in this issue of FLIGHT. Yet she was able to alight during a gale, in a sea which, in proportion to her size, must have been tremendous, and not only so, but she was able to ride the sea for ten days and nights—not, it must be supposed, without exertions on the part of the crew to keep her "hove to," but nevertheless safely. Does not this feat augur well for the future, when we come to build boats, as assuredly some day we shall, two or three times the size of the P.N.9? We think it must be admitted that it does. Incidentally, it would be interesting to know how an ordinary boat of about the same size as the hull of the P.N.9 would have fared in that gale.

Not only is the P.N.9 not a particularly large flying boat, but as regards its hull lines it is actually quite an old design, having been developed from the original British Felixstowe F.5 boats, whose flat sides and straight V-bottom it has retained. Improvements there have been, undoubtedly, but these are, we believe, mainly in the matter of construction and not so much in outward shape of hull, and the latest types of flexible hulls of more or less circular section with built-on steps are generally regarded as marking a distinct advance in design, so that with metal construction a vast improvement should be effected.

It must, we think, be admitted that in all probability it was the all-metal hull which saved the P.N.9, for it seems unlikely that a wood-constructed, straight-line hull could have withstood for ten days the buffeting which the machine must have received. Thus, a very practical and very convincing proof has been afforded of the soundness of the views expressed by Mr. Simmonds in his paper, and shared by Commander Cave-Brown-Cave during the ensuing discussion, that we should seriously take up the problems of all-metal construction of flying boats. We have, as regards hull shapes, probably the most efficient flying boats in the world in such machines as the Supermarine "Southampton," Mr. Manning's English Electric Co. machines, the Fairey "Atalantas," etc., and Short Brothers have demonstrated that we can in this country build hulls of Duralumin which are at least as light as wooden hulls, probably rather lighter, and without the disadvantages of water soakage. There is, therefore, apparently, good justification for turning seriously to the problem of all-metal flying-boat construction, and we think equally so for looking towards the future with every confidence.

Turning from the subject of design and construction to that of racing, there is also reason to be satisfied. The fact that both the seaplane challengers for the Schneider Cup race this year have been passed by the Air Ministry is in itself a proof that they are considered worthy to uphold the prestige of Great Britain in the only International air race worth considering. What was the exact top speed stipulated by the Air Ministry as a condition for "lending" the machines to their constructors for the purpose of the race, we do not know. It may be taken for granted, however, that it was a figure which would give the challengers a reasonable chance in the race, and as it is fairly certain that the American defenders of this year's Schneider Cup will do probably, at least, 225 m.p.h., it may be expected that our machines will at any rate do round about some such figure.

The Supermarine-Napier S.4 is a twin-float monoplane fitted with a Napier engine which develops—well, quite a few h.p., and the Gloster-Napier III has a similar engine, and is also a twin float machine, but, true to Mr. Folland's practice, it is a biplane. The former machine will, of course, be piloted by Capt. Biard, while the Gloster-Napier III will be handled by Mr. Broad, the well-known de Havilland pilot. It is interesting to note that Mr. Bert Hinkler is to go to the States as reserve pilot, and it is good news that "Bert," as everyone affectionately calls him, is thus officially regarded as one of our "star turns."

Concerning the arrangements this year there is cause for satisfaction. The machines are ready and have been thoroughly tested-out. That is a great step forward, and rather a different story from what has too frequently been the case in the past. The machines and their "crews" will sail in the "Minnewaska," the Atlantic Transport Co. having very generously and patriotically agreed to transport the machines free of charge. In America the U.S. Navy Department has, in a thoroughly sporting spirit, which is duly appreciated on this side, offered to place at the disposal of the British pilots machines for use in practising and in becoming familiar with the course. And, finally, our own Lords Commissioners of the Admiralty have promised that H.M.S. "Valerian" shall be present at Baltimore during the races to lend assistance to the British challengers.

Never in the history of British aviation have we tackled an International speed race in so thorough a manner, and at last our designers and pilots are to be given a really fair chance. The race is sure to be a keenly-contested one, and there are still plenty of opportunities for slips 'twixt cup and lip, but, subject to no accidents, we should have a good sporting chance, and more than that no one would ask, least of all our pilots. We will conclude by expressing the wish that the best man—and machine—may win, and the hope that in the winner may be found one of the British challengers.

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Lasne Again!

SINCE beating the world's speed record over a distance of 1,000 km. (621.4 miles) Ferdinand Lasne, the famous French pilot, has been busy and has now beaten the world's speed records over 1,500 km. (932.1 miles) and 2,000 km. (1,242.8 miles). Flying the same Nieuport-Delage 42, with 450 Hispano engine, which he used in his previous record flight, and flying over the Villesauvage La Marmogne course, Lasne covered the 2,000 km. in 9 hours 8¼ mins. His average speeds were: Over 500 km. (310.7 miles) 219.367 km./h. (136.31 m.p.h.). Over 1,000 km. (621.4 miles) 219.308 km./h. (136.28 m.p.h.). Over 1,500 km. (932.1 miles) 218.287 km./h. (135.64 m.p.h.). Over 2,000 km. (1,242.8 miles) 218.759 km./h. (135.93 m.p.h.). The previous records over the 1,500 km. and 2,000 km. distances were held by the American Lieut. Harris, whose speeds were 114.35 m.p.h., and 114.23 m.p.h. respectively, so that the records have been beaten by a wide margin.

FLIGHT

"BRISTOLS" IN ITALY

New Caproni Fitted With Two "Jupiters"

ONE of the great advantages claimed for the radial air-cooled aero engine is its short overall length, which has the effect, when the engine is mounted in the nose of a tractor biplane, of greatly reducing the moment of inertia, thus adding very materially to the manœuvrability of the machine. That the radial engine has other advantages may be granted, but we think that perhaps the one just mentioned is often the deciding factor in the choice of engines for certain performances.

The machine in question is known as the Caproni 80, and has been designed as a night-bomber. From the accompanying illustrations it will be seen that the machine has somewhat the appearance of a semi-thick-wing flying boat, although, in point of fact, the C.80 is a land machine, but with a boat-built fuselage, and the hull placed very much as is the hull of a flying boat. In this respect, the general arrangement is somewhat reminiscent of that of the D.H.10, but the two

THE CAPRONI 80 : A night-bomber fitted with two Bristol "Jupiters" mounted in tandem. Three-quarter front view.

Another possibility of benefiting by the short length of radial engines has just been demonstrated by the famous Italian aircraft designer, Giovanni Caproni, by the production of a new type of machine in which two Bristol "Jupiter" engines are placed in tandem above the hull. Thanks to the arrangement of the engines, it has been possible to design a machine in which, in spite of the tandem arrangement, all heavy masses are concentrated within a fairly small compass, with consequent gain in manœuvrability.

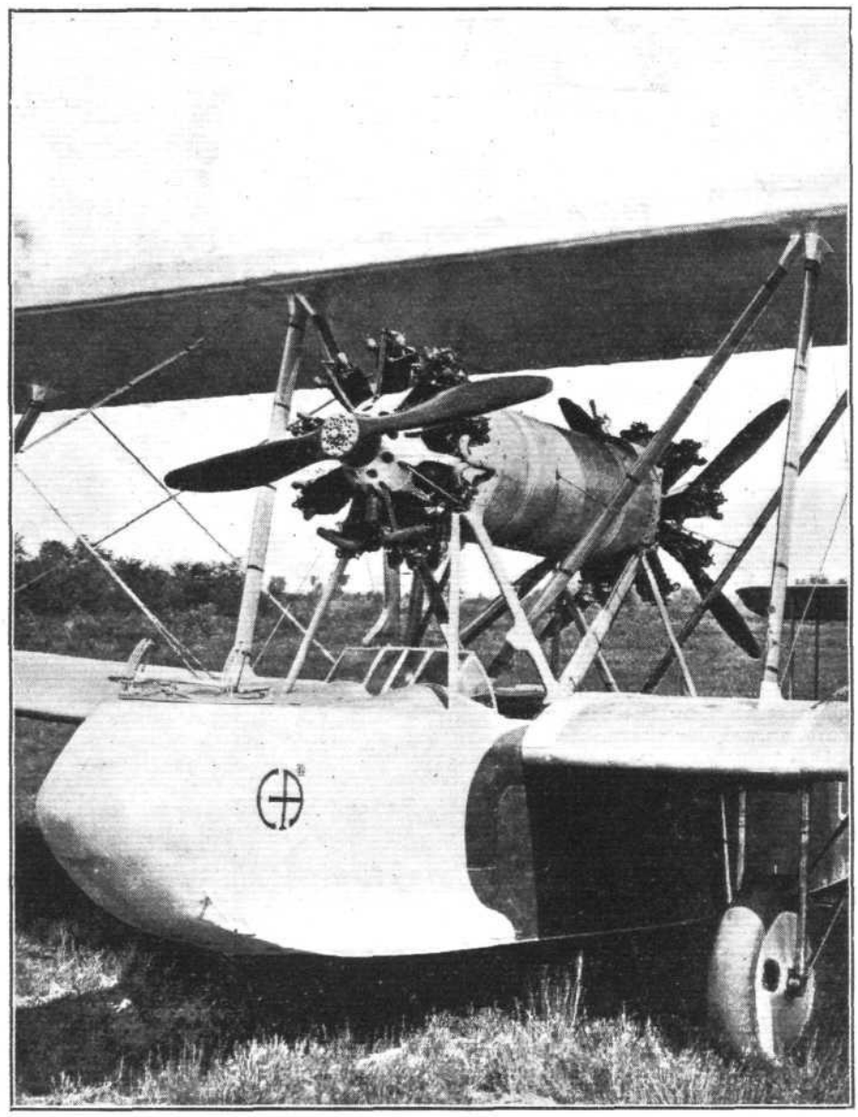
engines, instead of being placed on the wings, are, as already mentioned, placed centrally one behind the other above the hull, one driving a tractor airscrew and the other a pusher.

The tandem arrangement of engines has never been very much favoured in this country, but is one which has considerable vogue in certain foreign countries, notably in Italy, and it may be recollected that this is the arrangement chosen in the famous Dornier "Wal," of the type used by Amundsen in his recent attempt to reach the North Pole, and which

THE CAPRONI 80 NIGHT-BOMBER : Side view.

will also, it is hoped, be used by Capt. Wilkins in his projected expedition to the Antarctic, as related elsewhere in this issue of FLIGHT. In France also several machines have been built with this engine arrangement, notably the C.A.M.S. and Latham flying boats, both of which types have proved very successful. Wind tunnel experiments carried out in this country on tandem arrangements also seem to indicate that fundamentally there is no reason to expect it to give trouble, provided the rear airscrew is designed with slightly larger pitch than that of the tractor, so as to allow for the fact that it is working in the slipstream of the front propeller.

One advantage of the tandem arrangement is that, the centres of thrust of the two engines being concentric, no turning moment is set up by the fact of one engine stopping, as is the case when the engines are arranged on the wings. It is generally thought that when the front engine stops and the rear airscrew is no longer working in the slipstream of the front screw, the pitch of the pusher, having been made purposely greater to allow of its normal working in the slip stream of the front screw, is too great, and that thus a certain amount of loss of efficiency is incurred. Practical tests have not, however, so far as we are aware, proved this to be a serious objection, and we believe that in the Bolton and Paul "Bodmin," for instance (which has its engines centrally placed in the fuselage with transmission drive to airscrews on the wings), it was found that with the front engine and its propellers stopped, there was no appreciable loss of efficiency when the rear engine with its two "over-pitched" pusher screws was running by itself. It would thus seem that possibly this arrangement of engines is deserving of more attention than it has hitherto received in this country.



THE CAPRONI 80: View showing mounting of the two Bristol "Jupiter" engines. The petrol tanks are placed between the engines.

From a practical point of view, there is certainly considerably greater opportunity of effecting repairs or adjustments to an engine centrally placed than to one placed out on the wing, and the performances of the Caproni and other machines in which the tandem arrangement is employed seem to show that, from the point of view of efficiency also the tandem arrangement may have its advantages. Certain problems may crop up in connection with the presence and absence of slipstream on the tail planes, but in this respect the twin engine arrangement should if anything be preferable to the use of a single engine on a flying boat in which, when the engine stops, the whole of the slipstream disappears, whereas with the tandem arrangement there should be, if anything less difference in trim between "engine off" and "engine on" conditions, as only the slipstream of one engine would disappear in the case of accidental stopping of one engine.

In the main, the photographs of the Caproni 80 are self-explanatory. The central hull or fuselage is, as already mentioned, a boat-built structure, and the only unusual feature of the machine is the use of a short top plane.

The front view of the machine gives an excellent idea of the angle at which the interplane struts slope inwards. Presumably this arrangement has been chosen in order to reduce the end loads on the top spars. We have no information relating to the wing section used, but the photographs show it to be a fairly thick section, which fact, doubtless, accounts for the use of single-bay bracing.

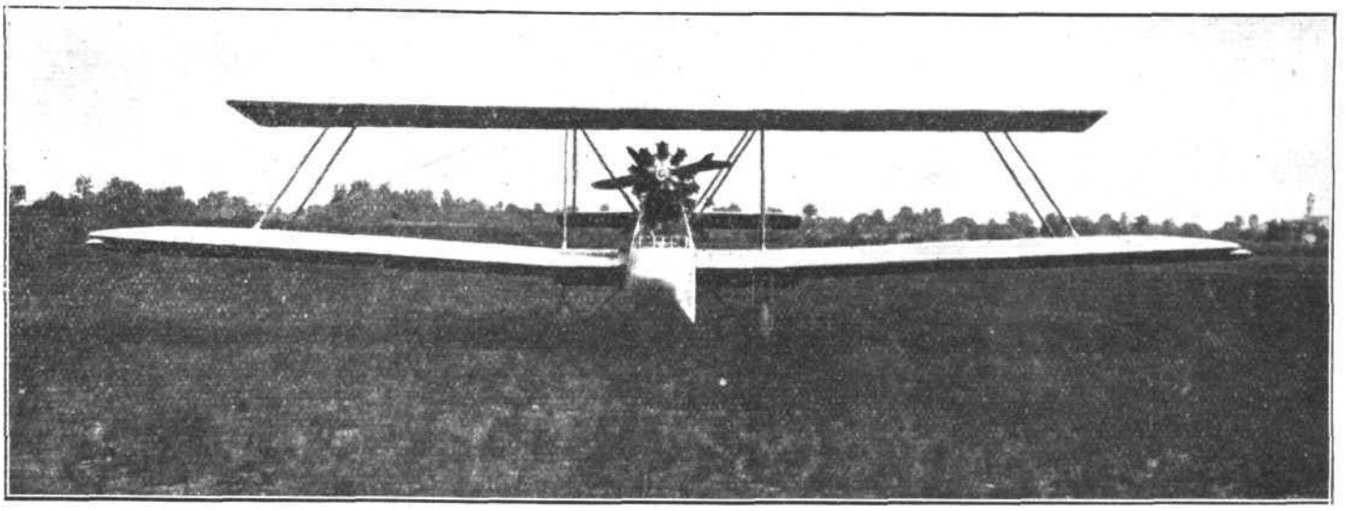
The two-wheeled undercarriage is attached underneath the inner interplane struts giving a wide wheel-track, and the whole arrangement seems to indicate the possibility of turning the machine, by suitable shaping of the hull, into a twin-engined amphibian flying boat. This, however, is not, we believe, the intention, but the particular arrangement chosen is due chiefly to the tandem engines and to a desire to provide an unrestricted field of fire for the two gunners.

It is stated, however, that should the machine be forced to descend on the water, the boat-built hull would keep it afloat for an indefinite period, while special air bags mounted under the lower plane, would give the necessary lateral stability on the water.

The two Bristol "Jupiter" engines are mounted on a structure independent of the wing structure, in the form of two sets of struts forming the letter "M" as seen in side elevation. The accessibility of the two engine units is well brought out in the photographs, and it may be added that the petrol tanks, which are placed between the engines, are separated from them by fire-proof bulkheads. Perhaps, according to British ideas, a preferable arrangement would have been to place the tanks in or on the top plane, giving direct gravity feed to the engines, but doubtless Signor Caproni was induced to place them between the engines by his desire to concentrate all heavy weights as far as possible so as to maintain good manœuvrability.

The pilot's cockpit is placed in line with the leading edge of the lower plane, below and slightly aft of the front engine. In view of the proximity of the tips of the front propeller, the substantial wind-screen fitted does not appear to be an unnecessary precaution.

Of the two cockpits for the gunners, one is arranged in the extreme nose, where the field of fire forward, and, in fact, throughout the whole hemisphere, is particularly unrestricted, while the rear gunner is situated just aft of the wing, where he commands a view and a more or less unrestricted field of fire in all directions, except forward, downward, and to some extent aft, where his field of fire is to some extent blanketed by the biplane tail. Altogether the machine seems well designed for self-protection against attackers. Its main



THE CAPRONI 80 : This front view gives an excellent idea of the slope of the inter-plane struts.

function, is, as already stated, that of a night-bomber, and bombs to the weight of 800 kgs. (1,760 lbs.) may be carried.

During preliminary flight tests it was found that the Caproni 80, carrying a useful load of 1,400 kgs. (3,080 lbs.), would fly level, or even climb slightly on one engine at a height of 3,300 ft. In later tests the following climbs were accomplished : the useful load in this case being 1,950 kgs. (4,300 lbs.) :—1,000 m. (3,300 ft.) in 5 m. 35*s.* ; 2,000 m. (6,600 ft.) in 12 m. 55*s.* ; 3,000 m. (10,000 ft.) in 21 m. 10*s.* ; 4,000 m. (13,000 ft.) in 32 m. 10*s.* and 4,500 m. (14,800 ft.) in 41 mins.

These performances were obtained without engine cowlings, and it is expected that with engine cowls and different propellers (a certain amount of experimenting still remains to be done to find the most suitable propellers for the somewhat peculiar conditions of the tandem arrangement), even better results will be obtained.

The weight of the machine empty is 2,900 kgs. (9,500 lbs.). The useful load will depend upon the performance required. If a ceiling of 2,000 m. is considered sufficient, the useful load can be as high as 3,300 kgs. (11,000 lbs.)

With the engine uncowled the top speed was 175 kms./hr. (109 m.p.h.), but it is expected that this will be considerably improved upon when the modifications indicated have been carried out. The landing speed is stated to be 71 kms./hr. (44 m.p.h.), which seems extremely low. As no figures are available relating to the wing area, it is not possible to form an opinion as to whether or not this figure for the stalling speed is likely to be accurate.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SCHNEIDER RACE.

A MEETING of the " Schneider " Committee was held at the Royal Aero Club on Wednesday, September 9, 1925, when there were present : Lieut.-Col. M. O. Darby (in the Chair), Comdr. James Bird, Mr. H. Burroughes, Maj. J. S. Buchanan, O.B.E., Mr. H. T. Vane, and H. E. Perrin.

The arrangements for the British team were considered, and it was decided that the machines and personnel should go by the *Minnewaska*, sailing on September 26, 1925, the Atlantic Transport Co., Ltd., having very kindly undertaken to ship the machines free of charge.

The two machines to represent the British Empire selected by the Royal Aero Club are as follows :—

Supermarine-Napier S.4.—Constructed by the Supermarine Aviation Works, Ltd., Southampton, fitted with 450 h.p. Napier " Lion " constructed by Messrs. D. Napier & Son, Ltd., Acton, London.
Pilot : Capt. H. C. Biard.

Gloster-Napier III.—Constructed by the Gloucestershire Aircraft Co., Ltd., Cheltenham, fitted with 450 h.p. Napier " Lion " constructed by Messrs. D. Napier & Son, Ltd., Acton, London.
Pilot : Capt. H. S. Broad.

Messrs. A. V. Roe & Co., Ltd., have kindly placed the services of Mr. Bert Hinkler at the disposal of the Royal Aero Club as reserve pilot, and he will proceed to Baltimore with the team. The American Navy Department has cabled the Royal Aero Club placing machines at the disposal of the British pilots, to enable them thoroughly to familiarise themselves with the course prior to the Race.

The Lords Commissioners of the Admiralty have advised the Royal Aero Club that arrangements have been made for H.M.S. *Valerian* to be present at Baltimore during the races to lend assistance to the British competitors.

TECHNICAL COMMITTEE

A meeting of the Technical Committee of the Royal Aero Club was held on Thursday, September 10, 1925, when there were present : Lieut.-Col. M. O'Gorman, C.B. (in the Chair), Maj. T. M. Barlow, Mr. W. O. Manning, Maj. R. H. Mayo, and Mr. H. E. Perrin (Secretary).

The Committee considered the Agenda for the forthcoming Conference in Prague on September 19-25 next.

The items included :—

Courses for high-speed records.
Records for helicopters.
Measurement of height records.
Limit of landing speed for high-speed races.
Fixing value of machines using the Carnet for touring purposes.

Lieut.-Col. M. O'Gorman will represent the Royal Aero Club at the Conference.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary

Royal United Service Institution

THE Royal United Service Institution has arranged for an interesting series of lectures for the coming winter. Amongst them we notice the following, which should be of special interest to readers of FLIGHT :—November 4—" The General Principles of Air Defence," by Group-Capt. W. F. MacNeece ; November 18—" Imperial Defence and the Co-ordination of the Three Services," by Maj.-Gen. Sir J. H. Davidson, M.P. ; December 16—" Air Communications in the Middle East," by Air Vice-Marshal Sir W. Sefton Brancker.

THE SAN FRANCISCO-HONOLULU FLIGHT

The Missing P.N.9 Flying-Boat Found

As reported in last week's FLIGHT, one of the two U.S. Navy P.N.9 flying-boats which started from San Francisco on August 31 in an attempt to fly to Honolulu, Hawaii (a distance of 2,400 miles), was forced to descend, owing to lack of fuel, when only some 300 miles from Honolulu. Strong head-winds encountered on the last stage of the journey was the cause of their running short of petrol. When Commander John Rodgers, who was in charge of the P.N. 9, No. 1, sent out his S.O.S. by wireless on September 1, stating that he would be forced to descend owing to lack of fuel, various U.S. Naval craft and seaplanes spent over a week searching the seas for the missing flying-boat and its crew of five, but without success. It was not until September 10 that the Submarine R.4, which was on its way to meet the fleet homeward bound from the Australian trip, and was diverted from its course with the forlorn hope of tracing the missing P.N.9, located the latter about 15 miles N.W. of Kauai Island—to which spot the machine had drifted nearly 500 miles from where it descended.

Only the wings of the machine were damaged, and the crew were well and happy, although naturally somewhat exhausted after their 218 hours of drifting helplessly on the sea—for their food had given out on the fifth day.

When the flying-boat was forced to descend a tropical storm was raging, but they managed to alight safely in spite of the rough sea. On the second day a merchant vessel was sighted about five miles off. In spite of their repeated signals, however, the steamer continued on its way. The only other ray of hope experienced by the 'plane wrecked crew was a far-off view of a seaplane—apparently looking for them—on September 8.

From time to time they picked up on their wireless reports regarding the search then in progress, including a final message broadcast from destroyers stating that a conference of searchers had decided that P.N.9, No. 1, and its crew were undoubtedly lost—"which" said one of the latter, "made us very angry." Of course, while they could receive messages, they were unable to transmit owing to the absence of an aerial, which was, during flight, suspended below the hull.

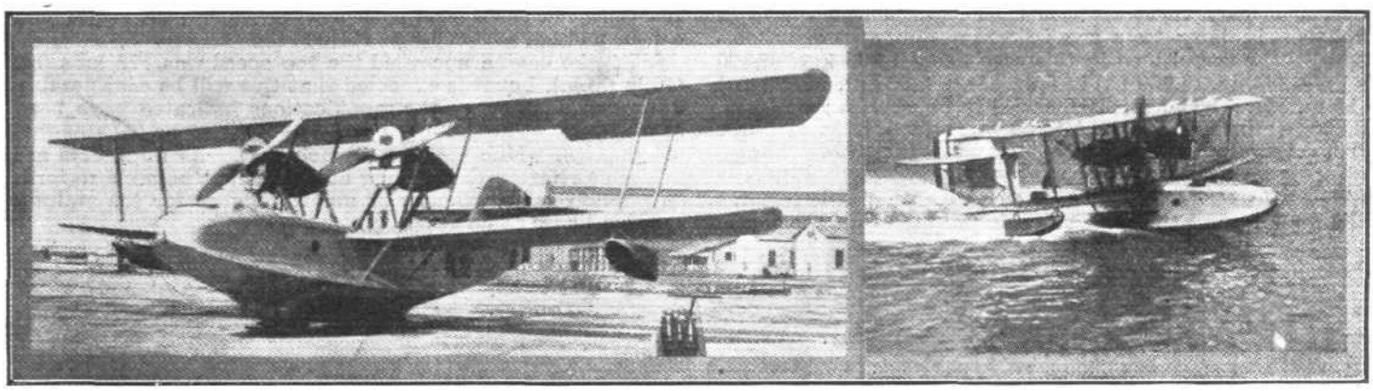
After their food had given out, they had to subsist on water—rainwater caught in some of the fabric torn from the wings, and seawater distilled by means of a small still, thoughtfully provided by Commander Rodger's mother. Naturally, by the time they were located by the submarine they were beginning to feel the effects of their exposure and intense heat of the Pacific sun. Commander Rodgers and his crew refused to leave their craft when the submarine came alongside, and remained on board while the submarine towed the flying-boat to Nawiliwiki, Kauai Island, and thus virtually completed their journey from San Francisco. They were supplied with food from the submarine. Just before they reached shore the tow line broke, and the machine narrowly escaped being wrecked on a reef. They still remained on board, however, eventually regained full control and reached shore safely. Practically the whole population of Kauai turned out to greet them, and many Hawaiians swam out to sea to meet them, while on September 11 they were given a congratulatory banquet by the Hawaiians.

Needless to say, the news of their rescue was received with considerable rejoicing throughout the United States, and in New York especially there were wild scenes of enthusiasm. The U.S. Navy Department has announced that Commander Rodgers has been appointed Assistant Chief of the Naval Bureau of Aeronautics.

Besides Commdr. John Rodgers, who is the son of Rear-Admiral John A. Rodgers, U.S. Navy, the others of the crew comprised Lieut. B. J. Connell, Chief Machinist's Mate S. R. Pope, W. M. Bowlin, and Chief Radio Operator O. G. Stantz.

As regards the machine; seeing that except for damage to the wings, partially intentional, the flying boat was in perfect condition when picked up, in spite of its 10-day buffeting in sometimes very heavy seas, a few brief particulars of the P.N.9 should be of interest.

The P.N.9 is a twin-engined metal-hull flying boat, which has developed through various stages from the F-5-L flying boat—the American version (war-time) of our F.5 or Felix-stowe boats. In 1923 the U.S. Naval Aircraft Factory constructed the first of the P.N developments—the P.N.7. This craft had two 525 h.p. Wright engines and possessed many improvements on the F-5-L. It put up many notable performances, and towards the end of 1923 designs of a similar type, but built around a metal hull, were put in hand. This machine, the P.N.8, proved entirely satisfactory, but a desire to increase the cruising range resulted in the P.N.9 type.

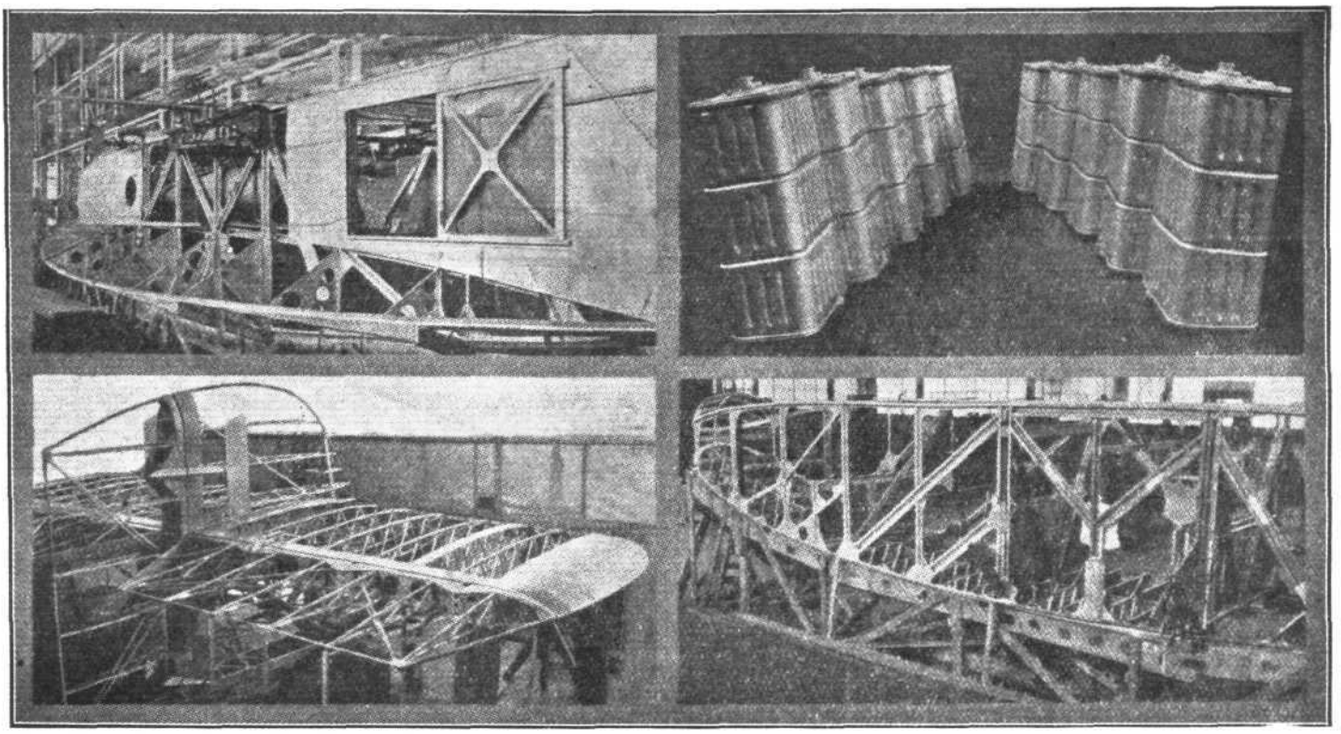


Two views of the P.N.9 twin-engined flying boat, one of which made such a remarkable flight last week from San Francisco to the Hawaiian Islands.

In this model two 480 h.p. Packard 1A-1,500 (12-cyl. water-cooled "V") engines were installed. The construction of the hull—which has, we think, demonstrated its soundness in the 'Frisco-Honolulu Flight—follows very closely the structural type of the "F-5" wooden hull. A slightly greater beam has been adopted in order that the displacement is at least equal to that of the wooden ones. It is entirely of aluminium alloy, except for certain highly stressed fittings; and the covers over the petrol compartment, where wood framing with plywood and fabric covering is retained.

All transverse bracing is done by bulkheads. The keelson is a built-up "I" section, weighing about 45 lbs., on either side of which are rolled "C" sections used as longitudinal stringers carrying the loads to main cross frames, spaced approximately 3 ft. on centre. Five watertight bulkheads are provided for strength and buoyancy in case of leakage if disabled at sea. The bottom is especially rugged, the main portion being made from ·081 in. heat-treated aluminium alloy.

The arrangements for the crew do not vary greatly from that employed on the F-5-L; the navigating compartment is forward, the two pilots (seated side by side) come next, then the petrol compartment, and behind this comes the W-T station followed by a gun cockpit. The 10 main petrol tanks are of aluminium, and ordinarily have a total capacity of about 1,200 gals. Aluminium alloy tubing is employed for



Some constructional details of the P.N.-9 flying boat. On the left, (top) metal keel-sponson frame, (bottom) tail group. On the right, (top) the aluminium-alloy petrol tanks, (bottom) forward portion of the metal hull frame.

the petrol piping. Auxiliary tanks are located in the upper wings. A general idea of the hull construction may be gathered from the above illustrations.

The engines are mounted between the wings on either side of the hull, with radiators around the airscrew hubs. It will be seen from one of the accompanying illustrations that the engines are very neatly cowled in.

In the wing construction the general arrangement employed on the P.N.-7 is retained. Upper and lower wings are of equal chord, but the top plane is slightly larger in span than the lower one, which is set at a dihedral angle. There are, apart from the engine-strut group, only one pair of interplane struts on each side of the hull. The numerous struts and wires, which were found necessary in the F-5-L type, have been eliminated.

Channels are the predominating shapes employed, and these have their face edges turned away from the surface. The fin is designed as an internally braced structure entirely. The horizontal surfaces are provided with one set of supporting struts on either side. The tail surfaces are of aluminium alloy frame construction with fabric covering.

The principal characteristics of the PN-9 are :—

Span (top)	72 ft. 10 ins.
Span (bottom)	67 ft. 2 ins.
Chord	9 ft. 0 ins.
Gap	9 ft. 4 ins.
O.A. length	49 ft. 2 ins.
Height	16 ft. 6 ins.
Dihedral angle	3°
Angle of incidence (both planes)	2°
Aileron measurements	19 ft. 3 ins. by 3 ft. 3 ins.
Length of hull	45 ft. 0 ins.
Beam of hull	10 ft. 2¼ ins.
Height of hull	7 ft. 0 ins.
Distance from step to bow	21 ft. 8½ ins.
Gross displacement of hull	46,000 lbs.
Gross displacement of wing floats (2)	3,210 lbs.
Clearance of wing float at full load	6 ins.
Structural weight	9,000 lbs.
Useful load	9,000 lbs.
Maximum speed	128 m.p.h.

Air Operations in Morocco

DURING the recent Franco-Spanish "Big Push" some good and useful work was carried out by aircraft. The Spanish landing of some 20,000 men at Alhucemas Bay was assisted by a large squadron of bombing aeroplanes. Spanish aircraft also flew over Riff villages on September 7 and dropped thousands of copies of an ultimatum, translated into Arabic, giving the tribesmen three days to make their submission. On the French front bombing aircraft have also been busy, and the Riffs have suffered heavy losses as a result.

An Italian Air Tour Through Central Europe

FOUR Fiat B.R.1 biplanes of the Italian Air Force, commanded by Commandante Bolognesi, are making an aerial tour through Central Europe. On September 13 they arrived in Vienna from Udine, having crossed the Alps in a heavy rainstorm. From Vienna they will proceed by way of Budapest, Lemburg, Jassy, and Bucharest to Odessa, and Kharkoff returning via Kieff, Odessa, Bucharest, Stambul, Sofia, Belgrade and Budapest to Udine, Rome and Turin.

Air Route to India Survey

AIR VICE-MARSHAL SIR SEFTON BRANCKER, with Lieut.-Col. Minchin and Maj. Birchall (who are making a survey of the proposed air mail route to India), arrived by air at Baghdad from Cairo on September 9. They left Baghdad next day for Bushire, but when flying from Bushire to Basra, on September 12, the two machines conveying the party had to make forced landings—Sir Sefton's machine about two miles from Zubair, and the other machine at Mohammerah. Sir Sefton had to walk to Zubair, whence he proceeded by car to the R.A.F. station at Shaibah.

"Shenandoah" Inquiry

MR. WILBUR, U.S. Secretary of the Navy, has appointed a Naval Court of Inquiry to investigate the recent disaster to the rigid airship "Shenandoah." The Court will supplement the work of the Special Board appointed by President Coolidge to consider the general question of the nation's air policy.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-committee was held at No. 7, Iddesleigh House, September 10. Mr. W. S. Field was in the chair, and the other member of the committee present was Squadron-Leader E. B. Beauman. The committee considered in all 21 cases, and made grants to the amount of £88 7*s.* 10*d.* The next meeting was fixed for Thursday, September 24.

PROPOSED ANTARCTIC FLIGHT

Amundsen's "Wal" to be Used. Plans of Capt. G. H. Wilkins, M.C.

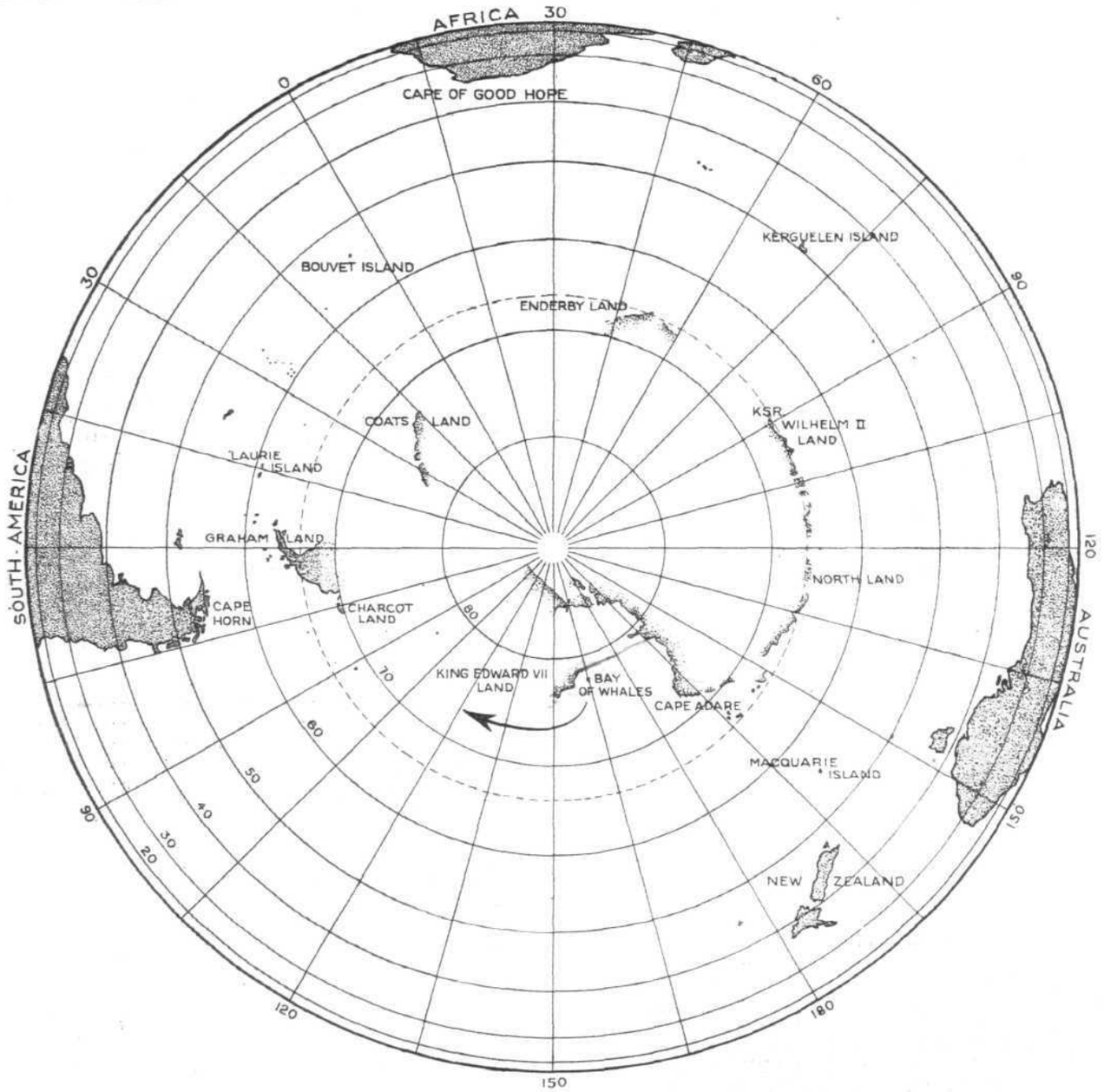
By MAJOR F. A. de V. ROBERTSON, V.D.

WHEN Capt. Roald Amundsen struggled back to his ship's party in one of the two Dornier "Wals" with which he and his party had set out, voices were heard to exclaim that the aeroplane had been proved unsuitable for polar exploration. One is really rather tired of hearing these sort of comments on aircraft of all sorts—landplanes, seaplanes, and airships—as they have fought their chequered way up through disaster after disaster to various stages of recognition and of promise. At any rate, this Wal, with its two Rolls-Royce "Eagle" engines, which brought the Amundsen party safely back, is to be used again for polar exploration. Its next sphere, however, will not be the Arctic, but the Antarctic.

All who follow the history of exploration, and most of those who have taken an interest in flying, will be familiar with the name, and at least some of the doings, of Capt. G. H. Wilkins, M.C. (and bar). He is a countryman of Sir Ross Smith and Bert Hinkler, his native State being South Australia. There are few places where he has not been and few things which he has not done. In 1910, he learnt to fly. In the Balkan war of 1912-13, he was a photographic correspondent with the Turkish forces. Scarcely was it over, than he joined Stephanson's Canadian expedition to the Arctic as second in command. He was in the Arctic when, in 1915, he heard that there was a war on in the world. He returned in 1917, and immediately received a commission in the Australian Flying Corps, but later was appointed official photographer to the A.I.F. It would have been strange if a man so familiar with danger and hardship had not won the Military Cross; but Capt. Wilkins won it twice, and was also twice mentioned in despatches.

After the War, the Commonwealth Government offered £10,000 for a flight from England to Australia, which, as everyone knows, was won by the Smith brothers. It was really inevitable that Capt. Wilkins should enter for that, and he organised a party in a Blackburn "Kangaroo," with Mr. Valdemar Rendle, as first pilot and himself as navigator. The "Kangaroo," however, did not get further than Crete. In this connection, we should recall another competitor, the Sopwith "Wallaby," of which Capt. G. C. Matthews was pilot.

In 1920, Capt. Wilkins went south, as second in command of the British Imperial Antarctic Expedition, and in the next two years he was naturalist on Sir Ernest Shackleton's last voyage to the same regions. As a change from the sea and



PROPOSED ANTARCTIC FLIGHT: This sketch-map shows the regions which Capt. Wilkins hopes to survey from the air, and gives a good idea of the relative location of the various continents in relation to the South Pole. The particular stretch which Capt. Wilkins hopes to fly over is from the Bay of Whales to Grahamland, a distance of about 1,500 miles.

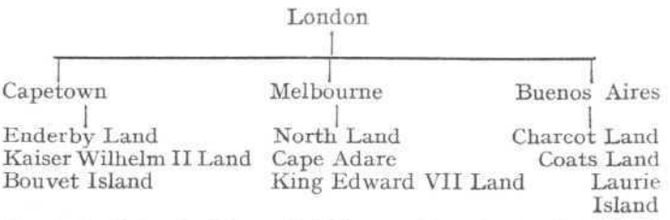
the air, he has lately been exploring the wild parts of Australia's Northern Territory on behalf of the British Museum, and the Museum is now inviting him to fill in a few odd months collecting fossils in Tanganyika.

Capt. Wilkins is not of those who believe the aeroplane to be useless for polar exploration, and he intends to use it as a medium for filling in some of the blanks on the Antarctic map. Something is known of the outline of the Ross Sea, and something of Graham Land, but of the coast line in between we are totally ignorant. We do not even know if Graham Land is an island or a promontory of the Antarctic continent. Capt. Wilkins means to fill in these blanks, and, as will be explained later, he believes that the knowledge gained will have a real, practical value to the world.

The Dornier "Wal" with two Rolls-Royce "Eagles," in which Amundsen returned, has accordingly been acquired, and may be flown over to Felixstowe this autumn. If funds permit a second machine will be taken out. Next summer Capt. Wilkins intends to take it to the Bay of Whales off King Edward VII. Land. Capt. Matthews and another pilot will accompany him, and Norwegian whaling captains have undertaken to carry them from New Zealand to Ross Sea. From the Bay of Whales they will fly eastward to Graham Land, a distance of some 1,500 miles. If all goes well, it should only mean 15 flying hours. But they will alight at two or three suitable points to take observations and determine their position. Capt. Wilkins will himself photograph the coast line the whole way, using a camera which is adjustable by hand, and aiming at a 50 per cent. overlap throughout. If the Wal should fail, the party will march on, for seals and penguins are plentiful and easy to bag, and they provide both food and fuel. Seal's blubber, says Capt. Wilkins, tastes just like Devonshire cream. But if they have to walk, it may take them three years to reach Graham's Land and to get in touch with the whalers who will take them to South America.

Apart from determining the actual coast line, this flight has various objects. One is to locate Dougherty Island, which is somewhat of an Antarctic myth. Some ships have reported its existence, and others have failed to find it where it was reported to be. For reasons to be explained later, it is important to know if this island really exists. Another object is to study, if possible, the movements of the whales. Some schools are known to move off eastward from Ross Sea, but it is not the same schools which arrive from the west at Graham Land. The question is whether the two lots of whales move in separate circles. If so, the spot where the circumferences meet or approach would be a strategic spot for the whalers to congregate. A greater discovery which may be made concerns the formation of the earth. Is the range of the Rockies and Andes continued across the Antarctic continent to reappear in New Zealand, and finally to culminate in the Himalayas?

This flight, extremely interesting and important as it should prove, is however only a preparation for a greater scheme which Capt. Wilkins has at heart—namely, to establish permanent posts for observing and reporting meteorological conditions in the Antarctic. The outline of the scheme is as follows. London would be the central station, and there would be collecting stations at Capetown, Melbourne, and Buenos Aires. Each of these would be a centre for four observing stations. Of these 12 observing stations, seven would be on the Antarctic continent and five on islands in the sub-Antarctic area. The former seven would maintain aircraft for making observations in summer of the movements of the ice. The five islands would make observations of the upper air by means of balloons. If, however, Dougherty Island does not exist or is not where it is supposed to be, another suitable spot will have to be chosen. At present, the scheme can be laid out as follows :—



Capt. Wilkins believes that when this scheme is in full operation it will be possible to foretell years of drought in, say, Australia, and to make proper provision to meet them. One such accurate warning would, he believes, save in hard cash all the cost of operating the scheme for 10 years. Correct meteorological information from the Antarctic would, in fact, react immediately upon the producing tracts of Australia New Zealand, South Africa and South America. The same cannot be said of information from the Arctic, for huge areas of comparatively barren lands lie between the polar regions and the producing tracts of Europe, Asia, and America. While it would cost about half a million to put the Antarctic scheme into operation, the annual contribution to its upkeep from each State which would be concerned is calculated at not more than £4,000.

From the flying point of view, we are all agreed that we cannot have too much meteorological information. Air services in the southernmost parts of the British Empire have already been started, and the movement will certainly grow. It may perhaps prove that the best way to send English mails to Australia is *via* South Africa; and if so we shall need to understand the air currents in the south of the Indian Ocean. Examples could be multiplied indefinitely.

Capt. Wilkins has submitted this scheme to the Royal Meteorological Society of London, which appointed a committee to consider it, composed of Col. H. G. Lyons (late Director-General of the Survey Department, Cairo), Sir Napier Shaw (late Director of the Meteorological Office, London), Dr. G. S. Simpson (Meteorological Office, London), and Dr. G. T. Walker (Director-General of the Observatories in India). The committee gave general approval to the scheme and added, "We should be prepared to encourage and support any undertaking which was adequately equipped in respect to apparatus and personnel for making scientific investigations."

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Amundsen's Next Polar Flight

CAPT. AMUNDSEN has acquired, provisionally upon the trials being satisfactory, from the Italian Government, the semi-rigid airship N.1 (described in FLIGHT for March 20, 1924) for next year's flight to the North Pole. Lieut. Riiser-Larsen stated at a meeting of the Norwegian Aero Club at Oslo last week that the expedition would consist of 16 in all, including Capt. Amundsen as leader, Mr. Ellsworth, Sig. Nobile (who designed the airship and who will act as pilot), Lieut. Riiser-Larsen (in command), Lieut. Dietrichson, Omdel, Horgen, Gustav Amundsen, and the Italian airship crew. At the suggestion of Capt. Amundsen certain modifications will be made to the airship, which, it is expected, will be ready by Christmas. After trials, the airship will fly to Pulham, thence to Vernes, and probably direct to Spitzbergen. Further trial flights will then be carried out, after which a start for the Pole will be made from King's Bay about April or May. From the Pole the return flight will be *via* Port Barrow and Nome, Alaska. Two mooring masts are to be erected, one at Vernes and the other at King's Bay. The N.1 will be re-christened the "Norway."

Deputy Air Chief for India

AIR COMMODORE C. L. N. NEWALL has succeeded Air Vice-Marshal J. M. Steel as Deputy Chief of the Air Staff in India.

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Paris-Karachi Flight Disaster

ON September 13 the two French aviators Thierry and Coste left Villesauvage (Etampes) aerodrome at 6 a.m. in a Breguet XIX-A2 biplane (480 h.p. Renault), with the object of attempting a non-stop flight to India. Weather conditions were ideal at the start, and they got away in good style. Two hours later, however, while flying over the Black Forest, they had trouble with the petrol system, and were forced to come down. In doing so the machine appears to have struck a tree and crashed into the Rotbach Brook. The machine was completely wrecked and Thierry was instantly killed. Coste, however, was only slightly injured, and was taken to a hospital in Freiburg.

R.A.F. Seaplane Down in Irish Sea

WHILE carrying out a flight from Pembroke to Campbeltown (Argyllshire) in connection with the naval manœuvres, the R.A.F. seaplane N.9899 had engine trouble and came down in the Irish sea. In response to S.O.S. signals, H.M.S. *Calliope* went to the assistance of the crew of seven, who were taken on board, and the seaplane was then towed into Belfast Lough (a distance of 100 miles).

New Air Services

A DIRECT air line between Paris and Copenhagen has been inaugurated, the service being twice weekly. Another service has been established between Basel-Mannheim-Frankfurt, *via* Freiburg and Baden-Baden.

LIGHT 'PLANE AND GLIDER NOTES

ALTHOUGH there is not a great deal to record this week, steady progress has been made at the various light 'plane clubs. It would appear that the Lancashire Aero Club, whose aerodrome is situated at Woodford, near Wilmslow, Manchester, at present holds the lead in the matter of machines. The two D.H. "Moths" have now been delivered, and some time ago Col. Darby, of A.D.C. Aircraft, Ltd., made this club a present of an A.D.C. Avro. In addition to these three machines, the club possesses a "Penguin" in the form of a light monoplane fitted with a Douglas motor-cycle engine. This machine, which has been built by members of the club, is intended mainly for taxi-ing. It may be remembered that in the early days of aviation it was standard practice at the Blériot flying schools to provide machines fitted with wings so small, that only in very exceptional circumstances would the "Penguins" get off the ground, but occasionally they were known to get off, usually to the astonishment of the pupil who happened to be aboard. Incidentally, it is of interest to note that Sir Charles Wakefield, Bart., has accepted the Presidency of the Lancashire Aero Club, in place of the late Viscount Leverhulme. Thus, Sir Charles has once more given proof of his very practical interest in the light 'plane movement, and the Lancashire Aero Club is to be congratulated upon its very distinguished President.

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AT the London Aeroplane Club at Stag Lane work has been progressing favourably, but up to the time of going to Press with these notes we have not learned of any club member taking his "ticket," although it is quite likely that Ticket No. 1 of the club series will have been granted by the time this week's issue of FLIGHT is distributed.

* * *

FROM the Midland Aero Club there is not much to record this week, but we are informed that this club has just begun to get things moving again, and it is hoped that next week there may be some definite progress to record. The flying ground of this club is at Castle Bromwich.

* * *

AFTER a period of comparative uncertainty, the Newcastle-on-Tyne Aero Club has secured the aerodrome at Cramlington, which covers an area of something like 82 acres. There are several buildings on the ground which, although they have been partly dismantled as regards the interiors, will provide very suitable club room accommodation when they have been overhauled. Up to the time of going to Press, this club had not received its two "Moths," but it is expected they will be delivered during this week. One of them is to be flown up by the Chairman of the Committee, Mr. W. Baxter Ellis, who has been flying at Stag Lane, and who has obtained his "A" licence.

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FROM the south coast comes the information that an attempt is being made there to form a club to be known as the Southern Light 'Plane Club, with the object of stimulating and increasing the interest in light 'plane flying in the southern counties. The Hon. Secretary of the club is Engineer-Capt. F. J. Drover, R.N., who writes to tell us that ladies and gentlemen now joining will be charged a nominal fee of one guinea for the remainder of 1925. After that the annual subscription will be one guinea, and for new members an entrance fee of one guinea will be charged. Instruction in flying will, it is stated, be given by a well-known pilot, and we gather that an "Avro" biplane will be used for a start. Applications for membership, accompanied by crossed cheques or postal orders made payable to the Southern Light 'Plane Club, may be sent to the Hon. Secretary, whose address is Wellington Road, Portslade.

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A CORRESPONDENT, whose letter is published on page 606, raises the question of the future of light 'plane clubs as regards the number of machines available, which was made the subject of Editorical comment in FLIGHT some weeks ago, and he also refers to the question of amateur construction of light 'planes in connection with the suggestion made, some weeks ago, by another correspondent, that the clubs should attempt to secure some old Caudron biplanes for school work. Our correspondent thinks that, with so many club members intimately acquainted with aircraft construction, there would be no great harm done by letting the members build their own machines, under the supervision of a Ground Engineer, who is, of course, again responsible to the Aircraft Inspection Department.

IT is now something like two years since FLIGHT first raised the question of the desirability or otherwise of amateur construction of light 'planes, and in our issue of November 22, 1923, we published an article entitled "Amateur Construction of Light Aeroplanes," in which the subject was dealt with fairly fully. Before publishing the article we took the trouble to ascertain the views of the aircraft industry, and it was found that the industry was almost unanimous in vetoing the suggestion.

* * *

SINCE that time, however, conditions have changed somewhat, as it is not now suggested that anyone should be permitted to fly amateur-built machines, but that this permission should be confined to members of recognised light 'plane clubs, under, of course, proper official inspection, and with the Air Ministry's approval. In the article referred to, we expressed the opinion that by far the largest items in the construction of any aeroplane are those of erecting and assembling, and that, therefore, if aircraft firms could be persuaded to manufacture the component parts in reasonably large quantities, leaving it to the purchasers to assemble the machines, a great deal of expense might be saved.

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IT should not be outside the scope of the present light 'plane clubs to put together the various parts of a machine under proper guidance by qualified persons, of whom there must surely be several in each club who would be willing to undertake the work. In this manner, not only might the clubs be enabled to increase very considerably their flying stock, but the members would receive some experience in construction, which could not fail to be of very material benefit, not only to themselves, but to the movement generally. The design would have to be got out specially with amateur construction in view, and, as we have previously pointed out, super-efficiency would not be required. On the contrary, a machine with a top speed of 60 m.p.h., which would cruise at about 45 to 50 m.p.h., and land at not more than 35 m.p.h., should be sufficient, and simplicity of structure and ease of repairs should be aimed at, rather than great aerodynamic efficiency.

* * *

THAT there are certain objections to such a scheme cannot, of course, be denied, but we do think that unless the Air Ministry is prepared not only to continue to give the clubs financial aid, but to increase very materially the subsidies to the clubs, the movement is not likely to be a success if something of that sort is not done. It might even be worth while for the Air Ministry to ask the construction firms to submit designs giving a quotation of the cost at which they would be prepared to supply the necessary components for, say, 25 machines. Or better still, the Air Ministry might offer a prize—a fairly substantial one—for the best design suitable for amateur construction, or, more correctly expressed, amateur assembly, the clubs themselves in conjunction with the Air Ministry being the judges to consider the most suitable design. The difficulties in the way are considerable, but we are very far from regarding them as insuperable. One danger which we foresee is that of too early standardisation; but if cheapness is to be attained, standardisation is almost inevitable, and until we do get cheapness we shall never accomplish very much.

* * *

IN the current issue of the journal of the Royal Aeronautical Society there is a very interesting and instructive paper by Squadron-Leader R. A. De H. Haig, A.F.C., R.A.F., entitled "Notes on the Flying Qualities of the Light Aeroplane Compared with Larger Types." It is not, of course, possible for us to publish the paper in full here, and we would refer readers to the September number of the *Journal*, but the following extracts are of more than usual interest :—

"Apart from scale, the general appearance of the light aeroplane is often in no way unusual, and one's first impression is possibly that of looking at an ordinary aeroplane through the wrong end of a telescope. Once inside the cockpit this idea takes to itself an even greater measure of reality. The only thing which has not become smaller and more fragile is the pilot himself, and he has at once emphatically to realise the delicacy and frailty of all parts of the structure with which he comes in contact. Hands and feet have to be placed in position with great care and knowledge, if injury to the structure is to be avoided, as there are few places which will safely take his weight.

"This latter is a point of some significance to designers of light aircraft. The reduction of weight gained by undue cockpit frailty is a questionable advantage, and some strengthening is inevitable if easy accidental damage is to be avoided in future designs."

* * *

AFTER stating that in taking off the length of run required is approximately the same as that of a heavily-loaded large aeroplane, while the climb after taking off is very similar, Squadron-Leader Haig says :—

"In the air the pilot is, as a rule, at once struck by the lightness and responsiveness of the controls. On a large and heavily loaded aeroplane there is nearly always the feeling that a crash is probable if the engine cuts out while taking off, unless one is taking off from a perfect aerodrome. As a contrast to this, the pilot of the light aeroplane takes off with the utmost confidence that, in case of engine failure, he will be able to manœuvre his machine so as to avoid any really serious damage. This case is upheld by the experience of the last Lympne meeting, when, notwithstanding the extraordinary number of forced landings, extremely few instances of injury to the aeroplanes occurred.

"It is on the score of manœuvrability that the light aeroplane really excels. As a rule, its controls are far superior to those of the large aeroplane at corresponding air speeds."

The author makes some very interesting observations concerning the extreme lightness of loads on the control stick and rudder bar, and points out that an out-of-trim condition, which would make a larger aeroplane unmanageable owing to control-stick loads, would be scarcely noticeable in a light aeroplane, and quite possibly the pilot would not be aware of this condition. Sqdn.-Ldr. Haig, very rightly, states that this lightness of control is a potential source of danger on the light aeroplane, the "feel" being relatively light throughout the speed range, and he arrives at the conclusion that, as a consequence of the reduced significance of "feel" and the different noise effect, the pilot should probably rely much more on his instruments than he normally does on larger aeroplanes.

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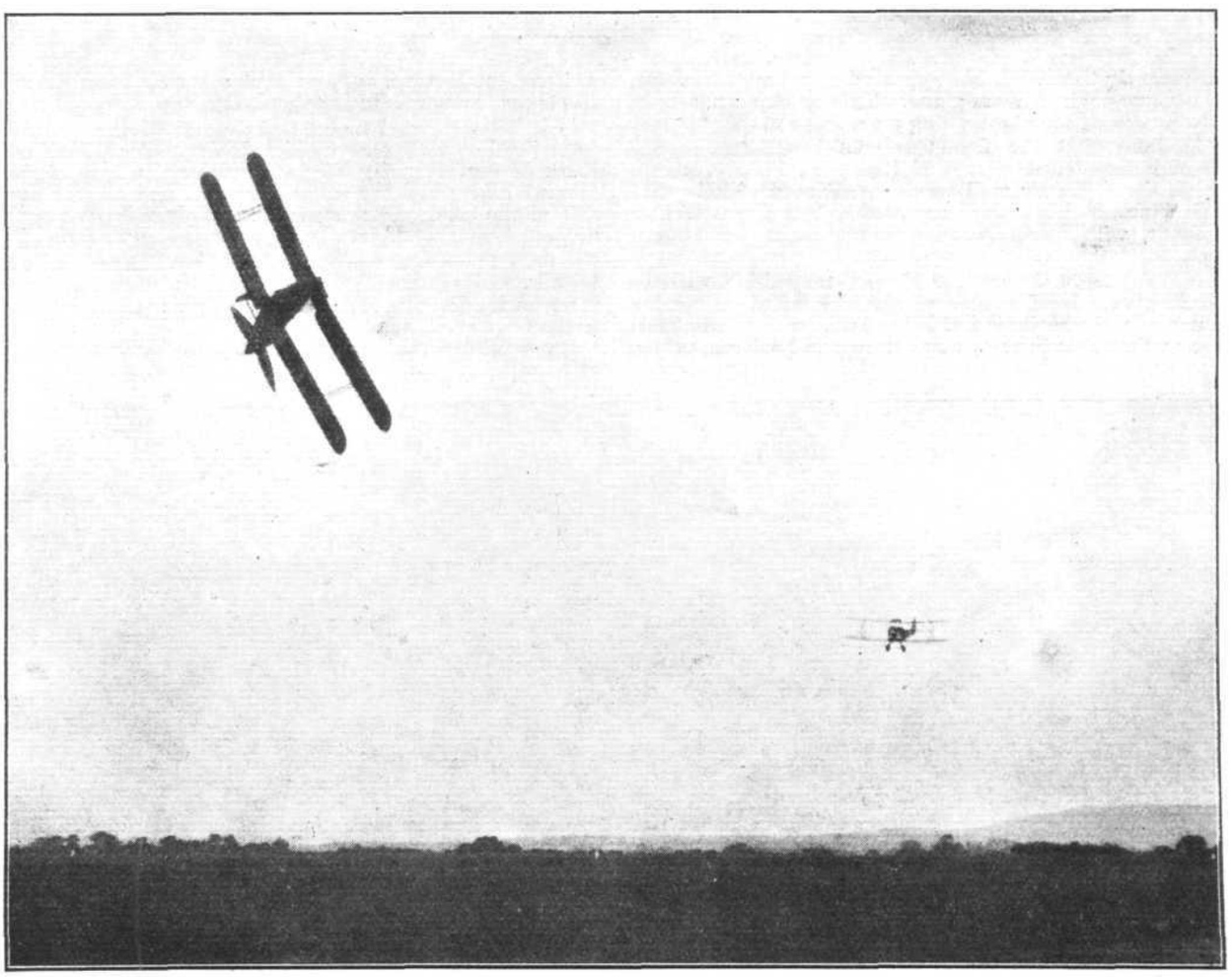
THE writer states that on most of the light aeroplanes which he has flown he has found it difficult to determine the approach of a stall other than by instruments. It is also pointed out that on a light aeroplane the height at which a stall can be safely carried out and recovered from is very much reduced, and the statement is made that, whilst on most large machines an intentional stall under 500 ft. is rather foolhardy, on light aeroplanes one can safely carry out a stall from 150 to 200 ft., given reasonably good controls. Continuing on this subject, Sqdn.-Ldr. Haig says : "I hold the opinion that there is a large field for investigation into the question of control near the stall in light aeroplanes. I think that the yawing due to aileron drag has a much more marked effect in the case of the light aeroplane than on others. This would undoubtedly be an interesting point for investigation if a research on the controllability of light aeroplanes at low speeds were instigated."

* * *

ON the subject of forced landings the following interesting remarks are found : "When considering forced landings, the light aeroplane strikes the pilot as the ideal machine for such an occasion. Its manœuvrability and slow speed, and consequent quick pull-up, are enormous assets in giving the pilot confidence when flying over bad country. It has to be realised, however, that it is not enough to get down safely into a small space ; it usually is necessary to consider taking off again after effecting the necessary repair. While its manœuvrability once again is an asset, its bad acceleration and climb are features which cannot be disregarded. It is generally feasible to fold the machine and wheel it to a more convenient field, when necessary."

Turning to the question of using the light aeroplane for aerodynamic research, Sqdn.-Ldr. Haig points out that full-scale experiments are usually very expensive, and may on occasions be dangerous, and suggests that a valuable aid to development work might be obtained by the introduction of the light aeroplane as an intermediate stage between model and full scale. The author recognises the many difficulties in the way, and admits that the light aeroplane can never be a model of the larger one in any accurate sense, but, nevertheless, considers that by this means the cost and risk of such work would be much reduced.



MANŒUVRABILITY : Two De Havilland "Moths" racing at Lympne during the August meeting. The leading machine is being piloted by Cobham, and that in the background by Broad.

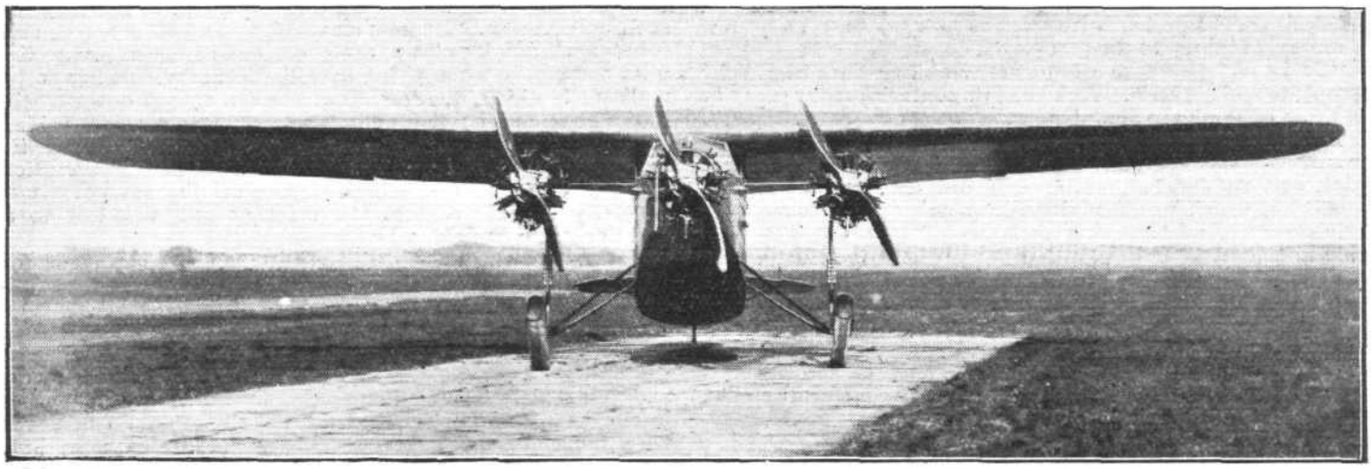
FIRST THREE-ENGINED FOKKER

Latest Development of F. VII Type

SINCE the first machine was produced, the Fokker VII type has been undergoing steady development and has made its appearance with a variety of engines, such as the Rolls-Royce "Eagle," Napier "Lion," and the "Liberty." It was, it will be remembered, on the Napier engine type that Mynheer Fokker gave a demonstration at Croydon of control at large angles, and on the same machine an altitude which only just misses being a world's record has been attained, while the "Liberty" engined machine holds the world's duration record for useful loads of 1,500 kgs. (3,300 lbs.) and a 1,000 kgs. (2,200 lbs.), with 3 hours 3½ mins.

instructions to the Amsterdam factory to develop the F.VII as a three-engined machine. Mr. Fokker cabled all principal dimensions and such special constructional details as were required to change the type from a single-engined into a three-engined machine.

Mr. Platz, chief draughtsman of the Fokker works, at once took the design and construction in hand, and three Wright "Whirlwind" engines with their propellers had, in the meantime, been obtained by Mr. Fokker in the States and despatched to Amsterdam, where they arrived in the beginning of August. At the end of August the machine was ready



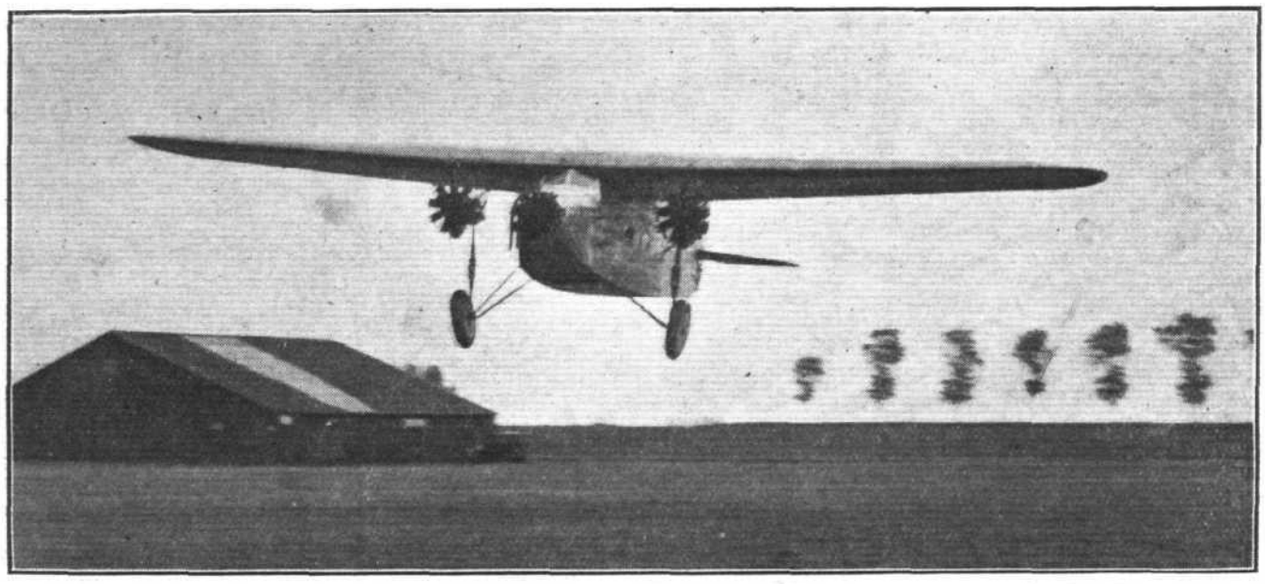
FIRST THREE-ENGINED FOKKER MONOPLANE : This is a development of the well-known type F.VII. The engines fitted are Wright "Whirlwinds," but if desired Armstrong-Siddeley "Lynx" engines can be substituted.

Quite recently the F. VII has appeared in yet another form, *i.e.*, as a three-engined monoplane. This machine has been specially produced for night flying on regular air routes, and we understand that the first specimen has already been packed and dispatched to the United States Government, for use on the night air mail services. It seems likely that other machines, if this type is accepted by the United States Government, will be constructed in the American Fokker factory.

Before referring to the machine itself, it may not be without interest to give a brief outline of the manner of its coming into being. In the beginning of July of this year, Mr. Fokker, who was at that time in the United States on business, cabled

to leave the factory, and, on September 3, it was dismantled and loaded on barges to be taken to the aerodrome at Schiphol, this being the usual method of transporting new machines from the Fokker factory, which is situated on the Northern bank of the river Ij, to the aerodrome, which is situated several kilometres out of Amsterdam, and on the opposite side of the city. By 9 a.m. on September 4 the parts were unloaded, and by 4 o'clock in the afternoon of the same day the monoplane was ready for flight, having had its engines tested and its tanks filled. At 4.30, Mr. Fokker himself took it up for its first test flight, carrying four passengers and some ballast.

The next day the machine was demonstrated before officials



THE THREE-ENGINED FOKKER MONOPLANE IN FLIGHT : The machine is capable of flying on any two of its engines.

of the K.L.M., and on Monday, September 7, Mr. Fokker gave demonstration flights before representatives of the Dutch and foreign press at the Schiphol aerodrome. During the demonstration the machine was repeatedly flown with one of the three engines stopped. Mr. Fokker first stopping one and then another, and it was found that with either two engines and carrying full load the machine would not only fly level but would actually climb. During the demonstration, Mr. Fokker throttled down one wing-engine completely just after the start—in other words, just at the most critical moment, and which would represent the accidental stopping of a wing engine just as the machine was taking off. Each time the machine climbed steadily.

Climbing to a somewhat greater altitude, Mr. Fokker shut off all three engines and stalled the machine. As in the single-engined F.VII, there was no perceptible tendency to spin or nose dive, the machine merely sinking slowly.

The next demonstration to be given consisted in flying the machine with only one engine running. Under these conditions it was not to be expected, of course, that the machine would fly level with full load, but the altitude lost was amazingly slight, so that even with two engines stopped (during the demonstrations the two idle engines were not merely throttled down, but actually stopped altogether), the machine would have a very good gliding angle, and the pilot should be able to pick a suitable field in which to make a forced landing. The manœuvre of flying on one engine was successively carried out with each of the three engines in turn, and whichever engine was used, the machine appeared to handle equally well. To show that with only one wing-engine running the machine was still perfectly controllable, Mr. Fokker made a quick turn against the pull of that engine.

With reference to the machine itself, this is, as will be seen from the photographs, practically a standard F.VII. An alteration which has evidently been necessitated by the addition of the two wing engines is that the telescopic struts of the undercarriage are taken to the wing instead of to the top of the fuselage. This is not a point in the design of which one can really approve, as in a bumpy landing severe stresses may be thrown on the wing structure without actual breakage occurring, and the machine might then be in danger of wing failure on a subsequent flight. The two wing engines are mounted upon what appear to be somewhat sketchy tubular structures attached to the lower bases of the wing spars, and in the photographs it will be seen that no cowling whatever is provided. Presumably, however, when the machine is further developed, suitable cowls will be placed over the wing engines so as to reduce head resistance, as this, one would imagine, must be fairly high with uncowled engines. In other respects, the machine has scarcely been altered with the exception that the fuselage has been slightly lengthened so as to give greater leverage for the rudder, in order to overcome the turning moment set up when one wing engine is stopped.

Normally, the new machine is fitted with a monoplane wing of 635 sq. ft. area, but a larger wing can be fitted, when the load capacity is increased by about 500 lbs. The three-engined monoplane, with the 635 sq. ft. wing, has seating accommodation for two pilots and eight passengers, and in addition there are two luggage compartments. With this small wing the machine carries a useful load of 3,200 lbs., which figure includes the weight of the two pilots and fuel for six hours at cruising speed. The actual paying load in this case is approximately 1,500 lbs. With this load the maximum speed is stated to be about 125 m.p.h., and the climb to 3,000 ft. is accomplished in 3¾ mins., while the altitude of 5,000 ft. is reached in 7¼ mins.

The present machine is, as already mentioned, fitted with three Wright "Whirlwind" engines of 200 h.p. each, but it is stated that the machine can equally well be equipped with other engines of about the same power, such as the Armstrong-Siddeley "Lynx."

◈ ◈ ◈ ◈

AIR MINISTRY NOTICES

Watchet Anti-Aircraft Artillery Range

IT is hereby notified :—

1. Anti-aircraft artillery practice which takes place at Watchet forms a danger to aircraft when flying above the area described below.

2. Pilots should therefore avoid this area, as no liability for accidents arising to aircraft as a result of such artillery practice will be admitted.

3. No special warning signals for aircraft will be displayed, but the usual flag signals, etc., as indicated, will be employed whenever firing is taking place.

4. *Details*

Description and Position.—An area comprising an irregular segment of a circle enclosed, on the seaward side, between the radii, approximately 6 miles in length, bearing 289° True and 70° True, respectively, and having as their centre a point approximately 1½ miles E. of Watchet, Somersetshire. The centre of this area is situated 8 miles E.N.E. of Minehead, in latitude 51° 13′ N., longitude 3° 18′ W.

Programme of Firing.—Daily until the end of September, 1925.

Warning Signals.—Red flags by day, and groups of three red lights, arranged in a vertical line, by night.

Air Pilot.—A reference to this Notice should be inserted, temporarily, in the Air Pilot, para. 71 (p. 22). (No. 50 of 1925.)

Stag Lane Aerodrome : Obstruction

IT is hereby notified :—An area of approximately one and a half acres has been fenced off temporarily in the N.E. corner of the Stag Lane (Edgware) aerodrome. The fence is marked by red flags. (No. 51 of 1925.)

◈ ◈ ◈ ◈

WORLD'S LARGEST PASSENGER AEROPLANE : The Vickers "Vanguard," which is shortly to be handed over to Imperial Airways, Ltd., has accommodation for 20 passengers and luggage. The wing span is a little over 87 ft., and the length is 60 ft. Carrying a useful load of approximately two tons, the machine has a cruising speed of 100 m.p.h. The two engines are Rolls-Royce "Condors" of 650 h.p. each.

AERONAUTICAL RESEARCH COMMITTEE REPORTS

FROM the number of enquiries we receive it appears that there is a desire in aircraft circles to know approximately the contents of the various technical publications of the Aeronautical Research Committee. All the aircraft firms probably receive these reports regularly, whether or not they contain anything of immediate interest or utility. In the case of draughtsmen, however, and others interested in aeronautics, who can hardly be expected to purchase all the reports, the problem of deciding whether any publication interests him is often a difficult one. As it is obviously desirable that the knowledge of aeronautics should be made available to all who take an interest in the subject, we have arranged with the Air Ministry to publish in FLIGHT summaries of all the technical publications as soon as these are issued, or shortly before they are published. All A.R.C. publications can be purchased from H.M. Stationery Offices at Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 120, George Street, Edinburgh, and through any bookseller.

An Experimental Investigation into the Properties of Certain Framed Structures having Redundant Bracing Members. Report 2. By Prof. A. J. Sutton Pippard, M.B.E., D.Sc., and G. H. W. Clifford, M.Sc. R. and M., No. 971. (Ae. 186.) (6 pages and 1 figure.) May, 1925. Price 3*d*. net.

In applying the usual criteria for the sufficiency of bracing of a framework it is assumed that all the members are capable of withstanding tensions or compressions of the necessary magnitude. Some of the members are able to resist tension only, and if the structure is completely braced without reference to such members it is known as "pseudo-redundant."

The cases taken for the present experimental investigation were as drastic as possible, the whole of the counter-bracing wires being disconnected. It is improbable that any one condition of loading would cause this to occur in an actual structure, and in that case the errors would be less in magnitude than those tabulated. The model used was the hexagonal structure previously experimented with in connection with the Airship Stressing Panels Report, and reported in R. and M., No. 948.

Full-scale Tests of a New Slot-and-Aileron Lateral Control. By H. L. Stevens, of the Royal Aircraft Establishment. Presented by the Director of Scientific Research. R. and M., No. 968. (Ae. 184.) (3 pages and 4 diagrams.) March, 1925. Price 3*d*. net.

Tests in flight of a new slot-and-aileron control have completed an important stage in the solution of the problem of obviating the serious deterioration in the controllability of aeroplanes which sets in as the flying speed is reduced to the minimum, and the wings reach and pass the critical or stalling angle. This control even at very large angles of incidence has neither of the long-recognised defects of the conventional ailerons when flying stalled, *i.e.*, rapid weakening of power to bank the aeroplane and a concomitant turning moment which, if not countered by powerful use of the rudder, leads to banking in the opposite sense.

The new control is thoroughly effective, and the result has been achieved by the use of a Handley Page slot in front of the ailerons, normally closed, but opening as the aileron in its rear is depressed. The use of this slot was first suggested by Mr. H. B. Irving, of the N.P.L., followed by model tests at the N.P.L., and by development by the R.A.E. for use in flight. The present report deals with these flight experiments. It has been recommended that this control be fitted to other aeroplanes as no measurable loss in performance has been found due to its use.

A Method of Improving the Properties of Aluminium Alloy Castings. By S. L. Archbutt, F.I.C., of the National Physical Laboratory. Presented by Dr. W. Rosenhain, F.R.S. R. and M., No. 959. (M. 28.) (10 pages and 5 diagrams.) December, 1924. Price 1*s*. net.

The experiments here described form part of the research on light aluminium alloys in progress at the Laboratory of the Engineering Co-ordinating Research Board, and have been carried out with the object of improving the soundness and mechanical properties of these alloys in the cast condition.

Up to the present Y-alloy has been the principal alloy studied. It is anticipated, however, that the treatment described will be applicable with advantage to other types of aluminium alloys and to an even wider field of cast alloys in general.

The experiments and the results obtained from them indicate the possibilities of a method of treating aluminium and certain of its alloys which serves to eliminate, at all events, a considerable proportion of dissolved gas, and thus reduces unsoundness, and to a considerable extent removes pin-holing. The process consists in allowing the molten alloy or metal to cool slowly in the crucible in the furnace until it has just completely solidified; it is then remelted, and may be carefully stirred, raised to the pouring temperature, and cast. Ingotting the metal is not satisfactory, as the ingots cool too quickly and during remelting are too much exposed to the furnace gases.

In a later experiment, passage of nitrogen through the melt during slow cooling and solidification has been found to improve still further the soundness of resulting sand-cast bars.

Slightly anomalous results have been obtained in some cases, and it is not yet clear how far the method is of value in other alloys. Simultaneously and independently, Prof. C. A. Edwards and Mr. Pryther, of Swansea, working on the effect of gases in copper (for the British Non-Ferrous Metals Research Association), have discovered a similar effect obtained by solidification in the crucible, in the case of pure copper.

REPORT OF THE AIRWORTHINESS OF AIRSHIP PANELS.

Reports and Memoranda, No. 970. (19 pages.) October, 1924. Price 9d. net.

Summary.—This paper contains the Report of the Airworthiness of Airships Panel which was appointed by the Aeronautical Research Committee with the following Terms of Reference :—

(*a*) To consider and report on questions affecting airworthiness of airships, having reference to broad principles only;

(*b*) To consider the extent to which it is possible to detect deterioration of material by examination without dismantling;

(*c*) to advise in general terms on the permissible degree of deterioration in materials, in answer to specific inquiry from the Air Ministry.

The Report of the Panel is divided into four sections as follows :—

(1) The estimation of the static and dynamic forces to which the whole airship and each part are subjected.

(2) The calculation of the primary and secondary stresses in the structure resulting from the loading.

(3) The various limiting conditions of loading which must be considered, and the appropriate factors of safety in each case.

(4) Other considerations affecting airworthiness.

Under No. (1) of the above heads, consideration is given to various conditions of loading due to gravity, together with the forces due to gas pressure, and aerodynamic loading in vertical and horizontal planes; to the loads imposed on an airship riding at a mooring mast, and to stresses due to gas bag pressures, doping tensions and similar effects.

A Note on the Katzmayr Effect. By W. L. Cowley, A.R.C.Sc. R. and M., No. 969. (Ae 185) (5 pages and 8 diagrams.) March, 1925. Price 6d. net.

Various attempts have been made to explain the phenomenon of soaring flight and a previous paper (R. and M., No. 742) published by the Aeronautical Research Committee, has dealt with this subject. More recently attempts have been made by Von R. Katzmayr to account for the phenomenon on theoretical grounds, and an American Report, N.A.C.A., No. 202, deals with his experiments on this subject; other experiments on the same subject have been made in France.

The present report summarises the work carried out on the lines adopted by Katzmayr, and arrives at the conclusion that soaring flight is possible by utilising the energy in the vertical components of natural winds even though this component is as frequently, and as strongly, downwards as upwards. Large values of negative drag were measured in a wind tunnel showing that soaring is possible, and that the "Katzmayr effects" are rational and readily explicable.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

THE ROYAL AIR FORCE

London Gazette, September 11

General Duties Branch

Flight-Lieut. A. P. Davidson is placed on half-pay, Scale B (Aug. 27).

Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., D.S.O., is placed on the retired list at his own request (Sept. 1). Flying Officer C. E. B. Winch is transfered to the Reserve, Class A (Sept. 7). Flying Officer T. H. R. Riggs, D.C.M., M.M. (Lieut., Lincs. Regt.), relinquishes his temporary commission on return to Army duty (Aug. 10). The short service commission of Pilot Officer on probation G. A. Younger is terminated on cessation of duty (Sept. 1).

Flying Officer D. H. MacDonald-Lawson (Lieut., Lancs. Fus., R.A.R.O.), is dismissed the Service by sentence of General Court-Martial (Aug. 13).

Stores Branch

Flying Officer E. N. D. Worsley is confirmed in rank (July 19).

Accountant Branch

Flying Officer J. C. Christian, M.C., is transferred to the Reserve, Class C (Sept. 5).

Medical Branch

Flying Officer T. V. O'Brien, M.B., is granted a permanent commission in the rank stated (September 9).

The following are granted short-service commissions as Flying Officers for three years on the Active List, with effect from, and with seniority of, the dates indicated :—J. McM. Wilder (Aug. 24), H. G. Maguire (Aug. 25).

Flying Officer H. W. D. Mackenzie, M.B., is transferred to the Reserve, Class D.1 (Sept. 9).

Reserve of Air Force Officers

F. W. Marshall is granted a commission in Class A. General Duties Branch as a Flying Officer on probation (Sept. 8). Flight-Lieut. P. André de Fontenay, D.F.C., is employed with the Regular Air Force for a period of one year (Sept. 7). Pilot Officer R. D. Wayman is confirmed in rank (Aug. 23). Flying Officer E. Marsden is transferred from Class B to Class C (Aug. 8).

Erratum

The date of appointment of the Flight Cadets granted permanent commissions in *Gazette* of Sept. 1 is July 30, and not as previously stated.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander : G. R. M. Reid, D.S.O., M.C., to Station Hqrs., Spittlegate, to command ; 15.9.25.

Squadron Leader E. R. Manning, D.S.O., M.C., to R.A.F. Depot, Uxbridge, 2.9.25, on transfer to Home Establishment.

Flight Lieutenants.—W. E. C. B. C. Forsyth, to R.T. Repair Depot, Shrewsbury. 14.9.25. R. M. Trevethan, M.C., to R.A.F. Depot, Uxbridge. 24.8.25.

Flying Officers.—Thomas Rose, D.F.C., to No. 43 Squadron, Henlow. 7.8.25. L. A. W. Deane to remain at No. 1 School of Technical Training (Boys), Halton, instead of to Inland Area Aircraft Depot, Henlow, as previously notified. W. N. Lancaster to remain at School of Technical Training (Men), Manston, instead of to The Packing Depot, Ascot, as previously notified. O. K. Stirling-Webb to Inland Area Aircraft, Henlow. 7.9.25, instead of to No. 1 School of Technical Training (Boys), Halton, as previously notified.

Flying Officers : L. H. Ridley, to R.A.F. Depot, Uxbridge ; 15.8.25. J. F. Dewar, to No. 7 Group Hqrs., Andover ; 30.8.25. F. E. Bond, to No. 461 Flight, Gosport ; 15.9.25. G. H. Smith, to Night Flying Flight, Biggin Hill ; 18.9.25. G. W. Higgs, to No. 7 Squadron, Bircham Newton ; 18.9.25. R. S. Greenslade, to R.A.F. (Cadet) College, Cranwell ; 21.9.25. J. S. Nichol, to No. 12 Squadron, Andover, instead of to No. 11 Squadron, Netheravon, as previously notified ; 27.9.25. A. Maughan, to the Packing Depot, Ascot ; 1.10.25. P. J. Chambers, to R.A.F. (Cadet) College, Cranwell ; 1.10.25. E. C. Barlow, to R.A.F. (Cadet) College, Cranwell ; 1.10.25. J. C. Hawtry, to R.A.F. (Cadet) College, Cranwell ; 21.9.25. B. J. Finn, to No. 23 Squadron, Henlow ; 1.7.25. C. F. Roupell, to R.A.F. (Cadet) College, Cranwell ; 1.10.25. P. Hill, to R.A.F. Depot, Uxbridge, on transfer to Home Establishment ; 31.8.25.

Pilot Officers : C. J. Pavia, to No. 5 Flying Training School, Sealand 12.9.25. J. R. Addams, to No. 43 Squadron, Henlow ; 3.7.25.

Pilot Officer A. H. W. J. Cocks, to R.A.F. Depot, Uxbridge, 11.9.25.

Stores Branch

Flight Lieuts. : L. A. Lavender, to Armament and Gunnery School, Eastchurch ; 21.9.25. W. G. MacD. Nicholl, to Inland Area Aircraft Depot, Henlow ; 5.10.25.

Flying Officers : E. A. Slater, to School of Balloon Training, Larkhill ; 1.10.25. C. W. H. Moller, to No. 11 Squadron, Netheravon ; 18.9.25.

Pilot Officer Alfred Amy to Marine Aircraft Experimental Establishment, Felixstowe, 9.9.25.

Accountant Branch

Flying Officers.—F. J. S. Short, to No. 1 Stores Depot, Kidbrooke, 15.9.25. H. E. Cardwell, A.F.C., to No. 1 Flying Training School, Netheravon, 29.9.25.

Pilot Officers : T. P. E. Campbell, J. O. Morrison, F. Rigby, R. J. Wishlade, to No. 1 Stores Depot, Kidbrooke ; 3.9.25.

IDEAL PISTON RING TONGS

A VERY ingenious tool for the fitting, replacement or removal of piston rings has been introduced by A. E. Menuge of Worplesdon, Surrey. Our illustration shows the tool. It consists of a double pair of nippers, which have an ingenious movement for the prongs. The two handles operate studs, with inclined planes, through which are pins to which the four fingers are pivotted.

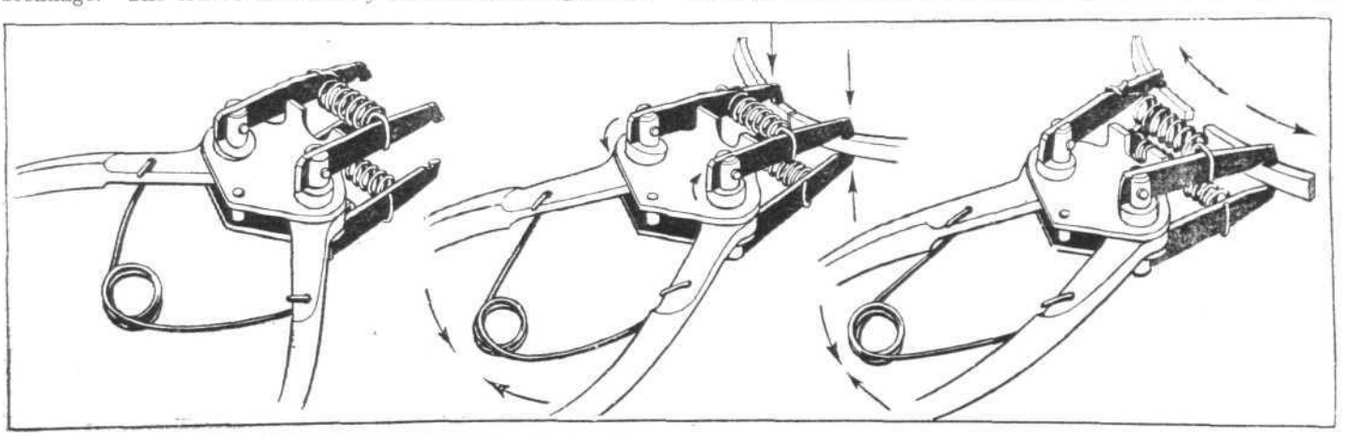
The first movement of closing the tool causes it to nip the piston ring at either side of the slot. This is caused by the inclined plane cam raising the inner ends of the levers. When the grip is so great that the inclined cams can turn no further relative to the levers, the cam moves the whole around and forces the levers away from each other, so opening the ring which can be slipped over the piston and into position in the piston-ring groove.

Rings can be handled with this tool without any fear of breakage. The tool is wonderfully well made, and good for years of strenuous usage. The price, post free, is seven shillings and six pence.

Mr. Menuge also sells a very ingenious piston-ring lock, known as the " Diadem." It consists of a steel band, which can be had in various sizes, and a link clamp by means of which the band can be compressed around three rings on the piston, holding them to the minimum diameter. The piston can then be pushed up (or down) the bore of the cylinder, the rings entering easily and leaving the clamp band behind.

The tool is made with bands of various sizes, which can be interchanged on the clamp link, so that pistons from 55 mm. to 80 mm. can be dealt with. The price for this set is ten shillings and six pence.

For big cams the tool is made up of four locks, with sixteen interchangeable bands in pairs of eight diameters for pistons from 75 mm. to 110 mm. The price of this set is twenty-eight shillings. The locks or bands separately cost two shillings each.



THE IDEAL PISTON RING TONGS : Left : Ready to grip the ring. Centre : The ring gripped. Right : The ring expanded ready to slip on or off the piston.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero-Models Association)

THE competition for the "FLIGHT Cup" took place at the Sudbury flying ground on Saturday, September 12. This was a competition for an entirely new type of model, the chief condition being that the model should consist of a *wing only*, the motive power being enclosed in the latter (for complete rules see FLIGHT of April 9). Considering the difficulties of the competition, it was not surprising that there were only a few entrants; nevertheless, the models were distinctly ingenious, two of them proving their qualities quite satisfactorily. The figures of these two machines are given below:—

Name.	Weight. Ozs.	Loading.	Best Duration. Secs.	Best Duration $\times \sqrt{\text{Loading}}$
1. D. A. Pavely	10	5.43	21	48.9
2. S. C. Hersom	11	5.22	11	25.1

Particulars of Mr. Pavely's winning model will be given in FLIGHT at a future date.

Mr. B. K. Johnson was obtaining good flights with a twin-tractor model throughout the afternoon, his best flight being 3.18 secs.

Saturday next, the 19th, at the Welsh Harp (3 p.m.), the society is holding hydro-aeroplane trials, and will be pleased if anyone outside the Society interested in such trials will turn up and witness the flying.

A. E. JONES, *Hon. Secretary*

* * * *

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

LIGHT 'PLANE CLUBS AND FLYING.

[2098] I am sure that all those who are interested in the Light Aeroplane Club movement will have followed, with interest, your editorial notes in FLIGHT, of August 27, and the opinions expressed by your correspondent in the issue of September 3.

The difficulties still facing the clubs are very real. The great thing seems to be that we must not forget that they *are* Light 'Plane Clubs, and that the real light 'plane is still awaited.

A fact which is seldom mentioned is that members of the clubs are anxious to fly—that is all; they do not desire to fly at 90 m.p.h.; the lowest speed at which it is reasonably safe to fly is sufficient. As you have continuously emphasised, the machine must be cheap, to buy, to run, and to repair, also easy to fly. It need not be highly efficient.

Once members have learnt to fly they will possibly develop a liking for more speed, when they must be expected to pay for it in increased charges to meet the added risk of damage. The average member only wishes to be able to fly cheaply. We need low landing speeds, but do we require high top speeds? Can we not have a really cheap single-seater?

The suggestion that machines of the Caudron type might be used has much to recommend it, though one is afraid that they will have to be new. Provided that it could be readily inspected inside, a fuselage machine might be preferable, however.

Each club has an associate or non-flying class of membership, and among these there is in most areas a good percentage of men who have had experience of aeroplane work. The ground engineers employed, and whose work is supervised by representatives of the A.I.D., could have charge of any practical work done. One is led to hope that it will be possible to turn out machines of simple type by the clubs themselves. The objections are fully appreciated, but one feels that much of the success of the clubs depends on such things as this.

It appears to be important for the clubs to tackle all problems of this nature, now that the initial difficulty of providing the first machines has been overcome. When they have, after a period of working, proved that their achievements warrant further encouragement, one thinks that this will be forthcoming.

I am convinced that a club cannot be carried on for long if the costs are high and the number of members thereby limited. This does not appear to be the method which will achieve the objects of the Light Aeroplane Club Scheme.

"AEROEN."

IMPORTS AND EXPORTS, 1924-1925

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; for 1922 see "FLIGHT" for January 18, 1923; for 1923, see "FLIGHT" for January 17, 1924; and for 1924, see "FLIGHT" for January 22, 1925.

	Imports.		Exports.		Re-Exports.	
	1924.	1925.	1924.	1925.	1924.	1925.
	£	£	£	£	£	£
Jan.	2,213	3,546	52,239	83,728	2,219	291
Feb.	920	985	26,349	85,639	335	20
Mar.	11,381	—	34,113	56,881	509	9,355
Apr.	373	321	56,998	78,041	6,014	6,732
May	3,426	560	125,138	74,844	4,162	15,278
June	1,219	190	87,629	71,009	2,115	667
July	1,510	184	179,292	159,262	2,708	870
Aug.	687	469	247,982	113,054	950	—
	21,727	6,255	809,740	722,458	19,012	33,213

* * * *

PUBLICATIONS RECEIVED

The Air Pilot Monthly Supplement. No. 10. *September*, 1925. Air Ministry, Kingsway, London, W.C. 2.

The Gloster. No. 3. *September-October*, 1925. Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.

British Standard Schedule of Steel for Die Blocks for Drop Forging. British Engineering Standards Association. No. 224, 1925. *July*, 1925. Crosby, Lockwood and Son. Price 1*s.* net; post free, 1*s.* 2*d.*

Moniteur Officiel du Commerce et de l'Industrie. No. 149. *September* 2, 1925. Office National du Commerce Exterieur, 22, Avenue Victor Emmanuel III, Paris. Price 2.50 fr.

Notiziario Tecnico. No. 2. *August*, 1925. Commissariato dell'Aeronautica. Dir. Sup. del Genio e delle Costruzioni Aeronautiche, Rome.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published September 17, 1925

6,840. A. ROHRBACH. Floating trollys for launching and beaching seaplanes. (214,213.)

18,529. A. ROHRBACH. Apparatus for beaching seaplanes. (228,493.)

20,999. BLACKBURN AEROPLANE AND MOTOR CO., LTD., and F. A. BUMPUS. Landing gear for aircraft. (238,711.)

25,659. J. TRNKA. Driving-gear for aircraft propellers. (238,742.)

25,873. BLACKBURN AEROPLANE and MOTOR CO., LTD., F. A. BUMPUS and J. D. RENNIE. Landing-gear for aircraft. (238,744.)

28,433. VICKERS, LTD., and W. F. BABBIDGE. Structure of i.c. engines. (238,755.)

FLIGHT

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